## REMARKS

This Preliminary Amendment is filed in response to the Final Office Action mailed on October 11, 2006, and the Advisory Action mailed on January 12, 2007, and herewith filed a Request for Continuing Examination. All objections and rejections are respectfully traversed.

Claims 1, 7-10, and 27-29 are currently pending.

Claims 27-30 are added to better claim the invention.

Please enter and consider the Amendment under 37 C.F.R. 1.116 filed on December 11, 2006.

## Request for Interview

The Applicant respectfully requests a telephonic interview with the Examiner after the Examiner has had an opportunity to consider this Amendment, but before the issuance of the next Office Action. The Applicant may be reached at 617-951-3067.

## Claim Rejections – 35 U.S.C. §103

At paragraphs 2-3 of the Office Action, claims 1, 7, 8, and 10 were rejected under 35 U.S.C. §103 as being unpatentable over Bostaph et al., US Patent Application Publication No. 2002/0076589, published on June, 20, 2002, hereinafter Bostaph, in view of Barber, US Patent No. 6,443,717, issued on Sept. 3, 2002, hereinafter Barber.

Additionally, the present invention, as set forth in claim 1, comprises in part:

1. A fluid controlling assembly for use in a direct oxidation fuel cell, which fuel cell has an anode chamber and a cathode chamber, the assembly comprising:

***an adjustable component at least a portion of which is disposed within the cathode chamber of the fuel cell, and said component, when adjusted, regulates the rate at which fluids travel into and out of the cathode chamber of the fuel cell.***

By way of background, Bostaph discloses an anode side (first electrode 18) and a cathode side (second electrode 22) for use in a fuel cell system. The anode side and the cathode side are separated by a protonically conducting electrolyte membrane. The cathode side sits in a current collector 28 within cap portion 27. The anode side sits in a recess 24 within base portion 14. The fuel cell system uses a methanol concentration sensor for regulating the mixture of fuel sent to the anode side. The methanol concentration sensor communicates with the inlets of the methanol chamber and water chamber to maintain 0.5%-4% methanol in the mixture.

Barber describes a variable valve timing approach to control air flow from compressors and expanders around a large scale fuel cell used in vehicles. The system uses a rotating disc that contains slots, which are either aligned with the ports to connect or block the connection of the port, thereby allowing or blocking the flow of air into the fuel cell. The compressor and expander are adjusted to regulate the volume flow control of the gaseous fluid supply system.

There is no suggestion of the combination in either reference to combine Bostaph or Barber. Barber merely regulates the volume flow of a fluid supply apparatus in a vehicular fuel cell application. Bostaph merely uses a sensor to control the methanol con-

centration of the fluid. There is no suggestion in Bostaph to use variable control valves to adjust the fuel concentration. Furthermore, Barber does not suggest using the variable valves within the fuel cell, i.e., within the cathode or the anode, because Barber is totally silent to both concepts in the reference.

The Examiner states there is suggestion to combine Barber and Bostaph, in Barber Col. 3, lines 26-31, which states:

> "One of the unique advantages of both the variable displacement and variable valve timing approaches to volume flow control is the ability to minutely adjust the air system to compensate for those undesirable, yet unavoidable, changes in the efficiency of fluid supply apparatus."

In reference to the statement above, Barber discloses a system for using a variable valve timing that compensates for the inefficiencies of a fluid supply apparatus, where the fluid supply in Barber is a gaseous fluid (Col.1, line 48-52). There is no suggestion to combine with Bostaph to regulate the flow of fluid to the cathode because Bostaph merely discloses using sensors to regulate the concentration of fuel to the anode. Additionally, both Applicant's invention and Bostaph do not use compressors or evaporators, and would require improper hindsight to look at a large scale fuel cell (used in vehicles) that uses a variable timing unit within the evaporator and compressor to maximize efficiency of the vaporous fuel supply.

Additionally, even if Bostaph and Barber were taken in combination, they do not teach or suggest Applicant's claimed novel ***an adjustable component at least a portion of which is disposed within the cathode chamber of the fuel cell, and said component,***

***when adjusted, regulates the rate at which fluids travel into and out of the cathode chamber of the fuel cell.*** There is no suggestion in either Bostaph or Barber of regulating fluid, such as water, within the cathode using an adjustable component, as claimed by Applicant's invention.

At page 11, lines 3-23 of the specification, shows the adjustable component regulating the fluid within the cathode chamber, and lines 3-23 state:

> "The fluid-controlling assembly 150 of the present invention is used to regulate the amount of liquid water or water vapor that is maintained in the cathode chamber 140 to adjust the humidity near the PCM 104, in a manner hereinafter described. More specifically as the fuel cell 102 operates, water is created at the cathode aspect of the fuel cell 108 in the cathode reaction of Equation (2). It is desirable to control the amount of water contained within the cathode chamber 140 because to the extent the PCM is not well humidified, the cell can dry out which decreases performance or even halts operation of the fuel cell 102. However, another consideration is that if too much water builds up on the cathode side, the fuel cell can tend to flood, which also can lead to decreased performance. Accordingly, the fluid controlling assembly of the present invention 150 regulates water and oxygen within the fuel cell system 130 by allowing an increase in the rate at which water escapes from the cathode aspect of the fuel cell, as well by allowing increased oxygen access to the cathode aspect of the fuel cell.
>
> More specifically, in accordance with the present invention the fluid controlling 150 regulates the amount of water that is kept near the membrane 104. The fluid controlling assembly 150 is actuated in this manner until the membrane of the fuel cell is properly hydrated. Thereafter, when a point is approached or reached in which there is too much water in the cathode chamber area, which could prevent sufficient oxygen from being introduced through the air breathing face 132, the assembly 150 is opened to allow more water vapor to escape by promoting evaporation and allowing more air (or oxygen) to enter the cell, and circulate through the cathode chamber of the fuel cell."

In reference to the statement above, the adjustable component is regulating the fluid that remains on the cathode side after the fuel is separated through the membrane.

In contrast, Bostaph merely controls the concentration of the fuel to the anode, and not to the cathode. The water generated on the side of the cathode is recovered through a recirculating channel. There is no suggestion in Bostaph of regulating the flow of water from the cathode to the recirculating channel as there are no valves or sensors coming from the cathode side. Even if combined with Barber there is no disclosure or suggestion of regulating the cathode in Barber. Barber merely controls gaseous fluid supply from a fuel cell using variable valve timing compressor and evaporator. There is no disclosure of a cathode or even an anode within Barber to suggest putting a variable timer within the fuel cell or a cathode without improper hindsight. Barber discloses regulating the air flow around a fuel cell and not within.

Additionally, Barber teaches away from Applicant's goal which further advances the believe that one skilled in the art would not find suggestion in Barber to combine with Bostaph to create Applicant's claimed invention without hindsight, which is improper. Barber teaches of regulating flow of water from the expander to remove all water from the expander by the adjustable disk "squeegeeing" the walls of the discharge manifold. Barber states the goal of removing all water from the expander at Col. 6, lines 23-43. The build up of water is detrimental to the expander device in Barber. Thus, this teaches away from Applicant's invention because Applicant in part attempts to maintain adequate hydration of the membrane, not to remove all water. In addition, as there is no disclosure or suggestion in Bostaph of maintaining humidity, a person skilled in the art would only combine the ideas in these references using improper hindsight from Applicant's claimed invention.

Accordingly, Applicant respectfully urges that the Bostaph patent application and the Barber patent, taken alone or in combination, are legally insufficient to render the presently claimed invention obvious under 35 U.S.C. § 103 because of the absence in the cited patents of Applicant's claimed novel ***an adjustable component at least a portion of which is disposed within the cathode chamber of the fuel cell, and said component, when adjusted, regulates the rate at which fluids travel into and out of the cathode chamber of the fuel cell.***

At paragraph 4 of the Office Action, claims 9 was rejected under 35 U.S.C. §103 as being unpatentable over Bostaph, in view of Barber, and in further view of Reynolds et al., US Patent No. 5,985,475, hereinafter Reynolds.

Applicant respectfully notes that claim 9 is a dependent claim that depends from an independent claim believed to be in condition for allowance. Accordingly, claim 9 is believed to be in condition for allowance.

All independent claims are believed to be in condition for allowance.

All dependent claims are dependent from independent claims which are believed to be in condition for allowance. Accordingly, all dependent claims are believed to be in condition for allowance.

Favorable action is respectfully solicited.

Please charge any additional fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,

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